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meteorologist; but many more observers are wanted in this direction than we have at present, and it would be especially desirable if photography could do for the details of spots what it has already done for the laws of their movement. Our own atmosphere is the great obstacle, and a more serious one in observations by day than by night, as weeks may pass without bringing an hour of definition suitable for the best use of the very large apertures indispensable for some of the observations which have been detailed, and their demand upon the time of the professional astronomer having other duties is frequently too great to be met. I should hardly have felt justified in commencing observations of this kind had I known the assiduous attention they require in awaiting what are in our climate the rare moments when they can best be made. I shall feel less regret for the disproportionate time thus spent, if the present communication should be at all instrumental in directing the attention of those private observers now possessing powerful instruments of a class comparable with that used to a most interesting field of research, as yet scarcely occupied, and in which their labours may be instrumental in laying the foundations of a future science of solar meteorology.

Allegheny Observatory,
Allegheny, Pennsylvania, 1874, *January* 30.

On the Approximate Calculation of the Times of Solar Eclipses.

By J. N. Lewis, Esq.

(*Extract from a Letter to Mr. J. W. L. Glaisher.*)

In the *Monthly Notices*, Vol. xxxii. p. 332, is an article by the Rev. S. J. Johnson, "On Future Solar Eclipses." In calculating these he makes use, for brevity, of the Tables contained in the eighth edition of the *Encyclopædia Britannica*, and he says he finds only one instance in which they are more than nine minutes out in the time of greatest obscuration. This recalls to mind that I prepared, a few years ago, a set of Tables of still greater brevity than those in the *Britannica*, and, according to the testimony of Mr. Johnson, more accurate also. As to this latter point, some results are given in the following Table. The Table of Epochs was prepared from the elements of the Moon's orbit given by Hansen (*Tables de la Lune*) and of the Sun's orbit by Le Verrier (*Annales de l'Observatoire de Paris*, tome iv.) taking into account the secular equations; and the equations to reduce the mean to the true syzygy were computed from the formula in Burckhardt's *Tables de la Lune* (Paris, 1812) p. 87, two small Tables being added for the purpose of taking into account the "Reduction," and the change in the velocity of the Moon's motion between the mean and the true syzygy; also for the Moon's latitude,

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parallax, &c. Very brief Solar Tables are also added. These Tables were intended to be used, in connection with a set of diagrams, or graphical constructions, for making a rapid examination of all the recorded ancient eclipses. They will give a pretty satisfactory representation of the circumstances of any eclipse from B.C. 720 to A.D. 2000, and thus save a vast amount of calculation that might otherwise be wasted upon eclipses that would turn out to be of no importance. They would thus serve as a criterion to indicate or point out the cases where exact calculations might be resorted to, without the risk of losing the labour and time expended. Among others, I intended to apply them to an examination of the Chinese eclipses, lists of which are given by Mr. Williams in Vol. xxiv of the *Monthly Notices*; but a press of other business has caused me to lay aside the whole matter until I shall have more leisure.

I send you the following comparisons. The results from the approximate Tables were, in each case, obtained by a few minutes of calculation. The numbers in the columns headed "True time" and "True latitude" are the results derived from extended Tables :—

Approx. Time of Syzygy.					True Time.			Discordance.	Moon's Latitude.		
									Approx.	True.	Discordance.
		d	h	m	d	h	m	m	′	′	′
1831	Feb.	12	5	14	12	5	13	+1	+42		
1832	July	27	2	1	27	2	2	−1	+4	+3	+1
1834	Nov.	30	6	45½	30	6	47·7	−2	+53	+51	+2
1836	May	15	2	7	15	2	7	0	+26	+26	0
1838	Mar.	25	9	45	25	9	45	0	−47	−46	−1
1838	Sept.	18	8	45	18	8	45	0	+47	+48	−1
1842	July	7	19	0	7	19	1	−1	+28	+28	0
1844	Dec.	9	8	12	9	8	13	−1	+72	+72	0
1846	Apr.	25	4	48	25	4	48	0	+11	+12	−1
1850	Aug.	7	9	34	7	9	33½	+½	0	+1	−1
1851	July	28	2	41	28	2	40½	+½	+45	+46	−1
1854	May	26	8	46	26	8	47	−1	+23	+21½	+1½
1858	Mar.	15	0	13	15	0	12	+1	+38	+38	0
1860	July	18	21	19	18	2	19	0	+34	+33	+1
1865	Oct.	19	4	27	19	4	26	+1	+30	+29	+1
1868	Feb.	23	2	19	23	2	20	−1	+5	+4	+1
1869	Aug.	7	10	6	7	10	7	−1	+41	+42	−1
1871	Dec.	11	16	1	11	16	1½	−½	+11	+11	0
1878	July	29	9	39	29	9	39	0	+38	+37	+1
1900	May	28	2	48	28	2	48	0	+23	+23	0
1905	Aug.	30	1	11	30	1	11	0	+35	+35	0

The parallaxes, hourly motions, &c., are given with a like degree of approximation.

Mount Vernon, Ohio, U.S.,
1874, *March* 2.

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